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ON
AGRICULTURE IN INDIA

INTRODUCTION
TO
VOLUME XII

EVIDENCE
TAKEN IN
BURMA



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BURMA

1. GENERAL FEATURES.

Burma is the northern part of the Indo-Chinese Peninsula and the most easterly province of the Indian Empire. It comprises all the country enclosed by the eastern off-shoots of the Himalayans and the sea. In the northern part it consists of high mountains; towards the south these mountains open out into separate ranges enclosing river valleys, while along the sea border is a flat coastal strip. It is shut off from India on the north-west by a mass of densely forest-clad mountains ranged in steep and high ridges running nearly north and south and intersected by deep and narrow valleys inhabited by wild tribes. These mountains form a barrier which has kept the peoples of the two countries separate in race, language, religion and customs. Its total area is given in the census of India as 233,707 square miles and in area it is the largest province of the Indian Empire, being more than twice the size of the United Provinces of Agra and Oudh; more than one-third larger than Madras; and nearly twice the size of Bombay. It lies between Assam on the north-west and China on the north-east and between the Bay of Bengal on the west and south-west and Siam on the south-east. Waterways form its main means of internal communication, while sea communications furnish the principal commercial link between Burma and the outside world, including the other provinces of the Indian Empire.

The main physical features of the province are its mountains and its rivers. The chief mountain ranges and their spurs run nearly north and south and make communication east and west difficult. The ranges gradually become lower as they run south and as they receive a bountiful rainfall they are plenteously covered with forest and other vegetation. The rivers of Burma are the key to its physical geography. They are three in number, the Irrawaddy, the Salween and the Sittang and flow from north to south parallel to the line of the mountain ranges. Their effect on the natural divisions of the country will be explained in the next section.

The rainfall varies greatly from tract to tract of the country, and, on the Arakan and Tenasserim coasts on which the monsoon coming across from Ceylon makes its first impact, the annual rainfall averages over 200 inches. In the Irrawaddy delta the average is about 100 inches. Here the monsoon breaks, as a rule, early in May and continues till the end of September. In Central Burma, between the Arakan Yomas on the west and the Shan Hills on the east, conditions approximate somewhat to those of the Indian Deccan. The Arakan Yomas protect this tract from the south-west monsoon and there are often long breaks of rainless

weather in the monsoon season. The average rainfall is a little over 30 inches. This is the only part of Burma where scarcity is at all likely to occur. The water channels are dry except in the wet season and there is a great deal of island and river bank cultivation as the Irrawaddy subsides after the rains. North of the central dry tract lies the Upper Burma wet zone comprising the districts of Katha, Bhamo, Myitkyina and part of the Shan States. The rainfall here varies considerably and ranges from 50 to 100 inches.

As most of Burma lies in the tropics, the climate generally, except in the dry zone of Central Burma, is hot and damp. On the hills to the north and east it is more temperate but Burma usually escapes the extremes of heat and cold to which northern India is subject. The maximum temperature in Lower Burma seldom rises to 100°. In Central Burma, it may reach 110° to 115°, but this excessive heat is compensated for by cooler nights in the winter months. In the Shan States and the Chin and Kachin Hills the elevation gives a temperate climate, the thermometer seldom rising above 80°, and in the colder months there is frost at night.

The agricultural practice of the country is almost entirely dictated by the rainfall and so much of the province has an assured and ample supply of rain that it is not surprising to find that rice dominates the agricultural energies of the country. Thus of the total occupied area, in 1925-26, of 19,969,425 acres, 11,558,371 were under rice. The acreage under all other crops was 4,473,894 acres only, of which sesamum contributed 1,132,862 acres, beans 795,005 acres, millet 700,789 acres, ground-nut 498,587 acres, cotton 449,168 acres and fruit gardens 370,840 acres. Minor crops are maize 199,388 acres, gram 118,166 acres and wheat 48,202 acres. The valuable crops, tobacco and rubber, occupied 83,665 and 79,222 acres respectively.

It is estimated that the culturable waste available is over 21 million acres, but this figure is purely conjectural.

As regards livestock, the supply of working bullocks would appear to have kept pace with the demand although prices have risen greatly in the last few years in sympathy with the rise of prices of other agricultural products. The last Season and Crop Report gives the number of working bullocks at 1,890,950, bulls 637,127, cows 1,391,797 and young stock 995,097. In Lower Burma and in the wet zone of Upper Burma, the buffalo is an animal of great agricultural importance and the figures for them are, buffalo bulls and bullocks 364,530, buffalo cows 401,094, buffalo calves 672,024. Sheep are relatively unimportant and thrive only in the central dry zone. They number 73,871. Goats are numerous though they receive little attention and number 620,696. Pigs are kept by Karens and the hill tribes and amount to 371,170. Horses and ponies number only 84,353.

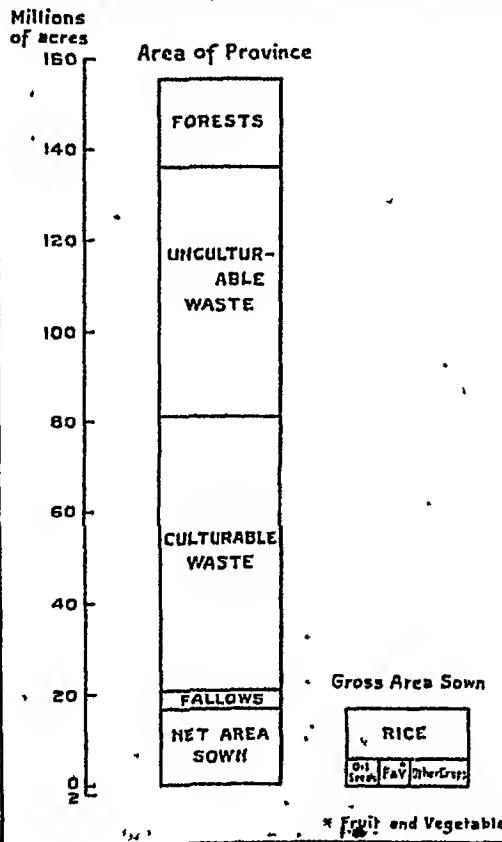
2. NATURAL DIVISIONS.

The agriculture of Burma is determined almost entirely by considerations of rainfall and the province divides naturally into four main regions

BURMA
CLASSIFICATION OF AREA AND AREA UNDER
VARIOUS CROPS

(Averages for the 5 years 1921-22 to 1925-26)

Note:— The difference between the Gross Area Sown and the Net Area Sown represents the area Sown more than once.



To face page 4

or tracts. The first and most important of these is the Lower Burma wet tract which comprises the Arakan, Tenasserim and Pegu divisions with a rainfall varying from 80 to well over 200 inches. In this tract falls the rich delta of the Irrawaddy and a narrow strip of level land in Arakan and Tenasserim between the mountains and the sea. This is the great rice tract of the province—entirely rain-fed. The area under rice has increased as follows:—

				Acres
1896		.	..	5,451,541
1906	..	..	..	9,283,801
1916	..	..	..	10,070,250
1926	..	..	..	11,558,371
1927	..	..	..	11,797,303

The export figures for the last ten years to India and elsewhere have been:—

Year	India		Total
	Tons	Elsewhere	
1917	659,824	801,980	1,551,810
1918	487,148	1,314,744	1,801,892
1919	2,175,170	418,590	2,593,760
1920	1,312,850	724,212	2,007,068
1921	1,432,850	804,090	2,236,940
1922	1,050,318	1,493,308	2,543,621
1923	790,967	1,453,037	2,250,004
1924	692,737	1,811,356	2,501,003
1925	1,427,807	1,907,838	3,335,705
1926	1,041,713	1,801,082	2,003,695

Apart from rice, a certain amount of sugarcane is cultivated on the alluvial land along the banks of streams while most villages of importance have groves of mangoes or coconuts. Tenasserim has valuable gardens of the much-prized durian and mango steen fruits peculiar to Burma and the Malay States. In Tenasserim also are found the principal rubber plantations..

The soil of the delta consists of old alluvium of great depth. On the ridges and foot-hills the soil is sandy or lateritic. Along the banks of the Irrawaddy and other rivers there are considerable stretches of

new alluvium on which such crops as beans and tobacco can be grown in the cold weather.

North of this wet alluvial tract lies the Upper Burma dry tract which occupies practically all the central belt of the country. In general appearance the country is undulating, consisting of low hills of tertiary formation. In Mandalay, and Kyaukse, however, there are large tracts of level land under cultivation. The soils vary from stiff black clay on the lower grounds to light sands and gravels on the slopes and uplands. Where irrigation is available, rice is exclusively cultivated as also in the valleys where it is rain-fed. Where irrigation is not available, dry cultivation is engaged in, the principal crops being the millets, maize, cotton, sesamum, gram, beans and groundnut. The introduction of this last crop, largely through the agency of a government garden, has completely revolutionised the agriculture of the dry zone and in twenty years its cultivation has advanced from practically *nil* to 460,000 acres.

The Upper Burma wet zone comprises the northern districts of the province, Katha, Bhamo, Myitkyina, the Upper Chindwin and parts of the northern Shan States. Vast tracts of country are available for cultivation here. The sparsity of population, difficulties of labour and the unhealthiness of the tract are limiting factors. Paddy is cultivated in the lowlands and shifting cultivation on the hills. In Myitkyina, a serious attempt is being made to grow sugarcane on a factory basis.

The last tract is the Shan States, a federation of States under the Governor of Burma. This tract has great agricultural possibilities, consisting as it does of a vast plateau extending from the eastern boundary of Burma to the Chinese frontier with an elevation of from 3,000 to 6,000 feet. Development is retarded however by lack of population and communications. Excellent potatoes are grown in the States while the wheat produced is of good quality.

The division between these climatic zones is not precise or definite and in them we come across areas of intermediate rainfall. For instance, between the Lower Burma wet tract and the central dry tract lies Pyinmana with a rainfall of from 50 to 80 inches where the best sugarcane in the province is cultivated. Cattle breeding is almost entirely confined to the dry zone and the Shan States, it being practically impossible to produce young stock in the wet tracts of Lower Burma or in the northern wet range. The cattle produced in the dry zone and in the Shan States are yearly driven down in huge droves for sale to the cultivators in the riverain tracts of Lower Burma.

3. PROVINCIAL INCOME AND EXPENDITURE.

The receipts and disbursements of the Government of Burma from 1921-22 till 1926-27 are shown in the following statement. The provincial contribution, originally Rs. 64 lakhs, was reduced for the years 1925-26 and 1926-27 and has been permanently remitted from 1927-28, and some Rs. 50 lakhs have thus become available for

the ordinary purposes of administration. From the point of view of agriculture and general rural uplift, the most interesting feature is the progressive expansion of expenditure on education, medical relief, public health, agriculture and industries.

GOVERNMENT

(Figures are in

Revenue and Expenditure

Receipt heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
Revenue Receipts						
Principal Heads of Revenue—						
Land Revenue .. .	531	400	472	571	534	523
Excise .. .	68	112	119	110	124	133
Stamps .. .	40	50	58	92	67	66
Forests .. .	221	183	178	182	210	217
Other heads .. .	88	5	5	12	10	21
Railways .. .	..	..	1	..	..	..
Irrigation .. .	4	42	30	30	43	24
Debt Services—						
Interest .. .	5	0	8	18	18	11½
Civil Administration—						
Administration of Justice .. .	7½	0	0	11	11	12
Jails and Convict Settlements .. .	4½	4	4	4	5	5
Police .. .	4½	6	6	9	5	5
Education .. .	3	4	4	5	5	6½
Medical .. .	1½	2	2	2	2	2½
Public Health .. .	..	..	..	1	1	1
Agriculture (including Veterinary and Co-operation) .. .	..	..	1	1	1	1
Industries .. .	..	..	..	..	..	..
Other departments .. .	1	1	1	2	4	3½
Civil Works .. .	0	8	16	13	9	13
Miscellaneous .. .	31	6	8	7	5	8
Miscellaneous adjustments between Central and Provincial Governments .. .	7	..	..	2	..	..
Extraordinary Receipts .. .	..	..	..	..	0	3
Total, Revenue Receipts ..	1,012	934	922	1,052	1,064	1,056

OF BURMA
 (lakhs of rupees)
charged to Revenue

Expenditure heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
<i>Expenditure charged to Revenue</i>						
Direct Demands on the Revenue—						
Land Revenue	34	51	51	67	69	68
Forests	03	102	102	97	81	84
Other heads	18	22	21	22	34	26
Capital outlay on forests charged to Revenue .. ..	..	..	..	..	5	4½
Railways	37	65	-100	..	..	-5
Irrigation—Revenue Account ..	33	06	49	16	15	36
Irrigation—Capital Account charged to Revenue	0	0	7	6	21	23
Duty—Interest	-14	-17	-13	-11	-14	-25
Civil Administration—						
General Administration	84	92	95	100	101	106½
Administration of Justice	43	19	55	59	42	65
Jails and Convict Settlements	24	20	30	27	29	30½
Police	148	141	112	102	125	140
Ports and Harbour	23	32	30	10	19	8½
Education	60	67	73	70	67	112½
Medical	31	39	34	36	39	48
Public Health	8	7	9	8	11	21
Agriculture (including Veterinary and Co-operation)	13	10	10	20	20	20
Industries	2	1	1	3	4	4½
Other departments	3	8	7	4	4	5½
Civil Works	100	203	213	102	213	233
Miscellaneous	46	51	60	75	70	87
Provincial Contribution	61	61	61	61	44	50
Miscellaneous adjustments between Central and Provincial Governments	30	2	..	2	1	31½
Total, Expenditure charged to Revenue	903	1,000	9,450	1,063	1,125	1,102

GOVERNMENT

(Figures are in

Capital Receipts

Receipt heads	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27
<i>Capital Receipts</i>						
Revenue Surplus ..	14	..	..	..	..	..
Famine Insurance Fund ..	1	..	..	0½	0½	1
Depreciation Fund ..	..	..	..	..	..	1½
Loans and Advances by Provincial Governments ..	23	27	26	37	14	27
Total, Capital Receipts ..	38	27	26	37½	41½	29½
Opening Balance ..	672	633	769	501	279½	243
Total ..	610	612	394	341½	324	272½

OF BURMA

(Lakhs of rupees)

and Expenditure

	1931-32	1932-33	1933-34	1934-35	1935-36	1936-37	1937-38
<i>Capital Expenditure</i>							
Revenue Deficit .....	..	107	17	3	24	37	37
Capital Investment (Ex-1)	..	..	..	..	..	..	..
Dept. and P.L. 1	..	..	..	..	..	..	41
Loans and Advances to Provincial Govt. (Ex-2)	..	23	24	24	21	4	21
Total Capital Expenditure	23	210	24	24	21	41	107
<i>Current Balance</i>							
Total	116	210	24	24	21	41	107

4. REVENUE ADMINISTRATION AND LAND RECORDS.

The tenure of agricultural land in Lower Burma is simple when compared with the variety of tenures found in other provinces. Briefly put, the ownership of land is regarded as vested in the State but by continuous possession for twelve years and the regular payment of revenue over that period, an occupant is given the status of a landholder. This gives him a permanent, heritable and transferable right of use and occupancy of his land, subject only to the payment of all such revenue tax, cesses and rates as may from time to time be imposed in respect of such land under any law for the time being in force and to the reservation to Government of all mines and mineral products and of all buried treasure. In order to establish his position as a landholder and to acquire a title deed as against the State, he is entitled to receive on application a landholder's certificate. Land may also be granted to cultivators for all time or by lease or given on licence for a specified period. Subject to the strict observance of the conditions attached to these grants and leases, the cultivator obtains a firm possession of his land as against Government or third parties. Where a cultivator has not obtained the status of a landholder or has not taken out a grant, licence or lease, he is a tenant-at-will of Government until he has attained twelve years of uninterrupted occupation and theoretically is liable to ejection without compensation during these twelve years. This power of Government is, however, only used in cases where non-agriculturists have obtained possession of land. In Upper Burma, land is divided into two categories, non-State and State. Non-State land was land in which the Burmese kings were understood to have recognised the existence of proprietary rights against the State. No rights against the State can be acquired on State land by occupation throughout a period of time or, as the regulation puts it, "an occupier of State land can have no heritable or transferable right of use or occupancy therein nor can any rights adverse to the Government exist in such land unless they have been created or continued by a grant made by or on behalf of the British Government." In the case of non-State land, a landholder has complete proprietary rights and is practically in the position of the person who has attained landholder's rights in Lower Burma. But rights to non-State land cannot be acquired in respect of land which was not declared non-State land when the tenure was decided after enquiry by Government. A consolidated land law applicable to Upper and Lower Burma is under consideration and will probably be introduced shortly in the form of a Bill in the Legislative Council.

Practically all occupied land in Burma has been cadastrally surveyed and mapped on a scale of 16 inches to the mile. Every field is surveyed in detail and the map is kept up to date by the local surveyors who are supposed to measure up new cultivation and mark other changes every year and bring the map up to date. This work is in the hands of the Land Records staff who maintain annually an accurate survey, a record of persons liable to assessment and an annual crop marking of all crops. The Land Records Department is a very strong one and

consists of revenue surveyors dealing with from 10,000 to 15,000 acres with inspectors, usually one to each township,* all working under the Superintendent of Land Records. The Superintendent of Land Records and his establishment are under the immediate control of the Deputy Commissioner who is responsible for the proper carrying out of all land records work. The whole department is under the control of the Commissioner of Settlements and Land Records.

Before land records, however, we have the settlement, which is not such an elaborate affair as it is in India. There is no settlement in the sense of an engagement made by a farmer to pay so much revenue in respect of so much land for such and such a period. The only things which are settled in Burma are rates of assessment and the period for which these rates are to be in force. The settlement officer in fact originally laid the foundation of all the revenue assessment and collection. He started off with a clean map provided by the Survey of India and entered the boundaries of every holding on the map. He then prepared a list of the persons in occupation of the land and proceeded to arrive at his assessment rates by crop cuttings to ascertain the fertility of the soil. On these results the land is divided into fertility classes. Enquiries into cost of production, the value of produce over a period of years and rents and mortgages are all recorded and he arrived at a theoretical rate on a proportion of the surplus left when the cost of production is subtracted from the average value of the produce. This theoretical rate, which Government claims as its right to take as revenue, is one-half of the net produce, but in point of fact this maximum is seldom, if ever, attained. Rents are only beginning to be a factor in the fixation of assessment rates though competition rents have always been taken into consideration. As a rule, settlements are for twenty years at the end of which period the settlement is revised. Enhanced rates notified after revision settlement must not exceed the expired rates by more than thirty-three per cent during the first five years of the new settlement nor during the next five years exceed sixty-six per cent, while allowance is made to cultivators who have incurred expenditure to improve their lands by the granting of exceptional and favourable terms. Assessment in Burma is a fluctuating assessment and separate rates are notified for separate assessment tracts within a district. Whenever waste land is brought under cultivation, the new area is measured up and assessed generally at the same rates as land in its immediate neighbourhood. In Lower Burma, a nominal acreage rate of two annas is assessed on land which is left fallow for special reasons. But in Upper Burma in the dry zone all land not cultivated is exempted from assessment. In Lower Burma where a crop is destroyed by floods or other natural cause, the land is not assessed and in the dry zone of Upper Burma, if the crop is less than three-quarters of normal, it is considered a total failure and completely exempted from assessment.

After the original settlement, the settlement party handed over to the Land Records Department their maps with the boundaries of holdings

* An administrative unit corresponding to a local revenue division of a district in India (tehsil).

marked and the holding register and these it is the duty of the Land Records Department to keep up to date. This holding register is only a record and has no presumption of validity. The Land Records staff merely enters against each holding the name of the person who appears primarily liable to revenue as in possession of the holding directly under the State and any dispute must be settled by the civil court. Where mutations are ordered by a court, they are communicated to the surveyor by the court. Mutations by registered holders must be brought to the surveyor's notice, and it is incumbent on all parties to alienation to report these to the revenue surveyor.

On his holding register and on his map, a. corrected, the revenue surveyor draws up his annual assessment register. He has also in the course of his field inspection recorded statistics of the areas under different crops and of tenancies, mortgages and sales. When the rolls of the assessment season are complete, he prepares a tax ticket for each holding and these tax tickets are issued from the Deputy Commissioner's office.

The total expenditure on the Land Records Department for 1925-26 amounted to Rs. 25,46,158, including figures for Rangoon and the special survey party. The percentage cost to total assessment (excluding figures for Rangoon and the special survey party) was 5.99.

5. THE CULTIVATOR.

The total population of Burma at the census of 1921 was 13,212,192, of whom no less than 9,158,932 were engaged directly or indirectly in agriculture. Although Burma is the largest of the Indian provinces, it is by far the most sparsely populated and the bulk of the population lives in villages which number 35,048 as against only 79 towns. The balance between males and females is very level, there being 6,756,969 males and 6,455,223 females.

The density of population per square mile in Burma stands at 57 as against 226 for all provinces of India, but beyond the statement of this fact no useful inferences as to under-population or over-population can be drawn. In some districts where cultivation is widespread, the population is naturally denser than in those where there is a large amount of forest or unculturable waste and it is enough to state the figures without trying to draw any particular conclusions. There are three principal races of Burma, the Burmese, the Karens and the Shans while in the north and north-west part of the province we find the Chins and Kachins. Of these by far the most important are the Burmans, and the predominating religion of the country is Buddhism in which at the last census no less than 11,172,981 persons affirmed their belief. Buddhists are more than 5½ times as numerous as all the non-Buddhists put together and are nearly 19 times as numerous as the Animists who are the next largest class.

The ordinary village-habitation is a hut raised on pile, some little distance off the ground, built of jungle timber and bamboo matting and roofed with thatch or split bamboo. Better class houses have plank walling and floors and corrugated iron roofs are more and more being adopted. The house as a rule consists of a front verandah and an upper room which is reached by a flight of steps. The front verandah is used

as the living room of the house, the cooking generally being done outside on the ground or in a small kitchen at the side of the building : the upper room forms the sleeping accommodation of the family.

The Burmese dress is very attractive. The male dress consists of a jacket which is generally white, a cotton or silk coloured skirt (*paso* or *longyi*) and a silk head covering (*gaungbaung*). The women wear a jacket resembling the men's and a petticoat or skirt of silk or cotton. A gaily dressed Burmese holiday crowd is a very pretty sight as the brilliant colours of their silks get their full value from the bright sunshine.

The life of the average cultivator is made up of periods of arduous and exhausting labour in the fields followed by considerable spells of comparative idleness. But these slack periods are fully taken up by pagoda festivals or *pyis* (theatrical performances) and the observance of other social and religious customs which tradition has imposed upon him. During the seasons he is not employed in the fields, he resides in his permanent dwelling in the village. In the rainy season, when the cultivation of paddy or other crops absorbs all his energies and attention, he spends the greater part of his time in the fields, and, for convenience in working his land, he builds there a temporary bamboo hut where he can live with his family or hired labourers and with his working bullocks beside him.

In the drier tract, there is a greater variety in the choice of a dwelling place and it is more common to find the cultivator living throughout the year on his holding. Even in the paddy plains of Lower Burma permanent homesteads are becoming common in some districts, but the homestead as such is not a feature of the country-side. This herding together in villages is partly due to the natural inclination of the cultivator himself and partly to the operation of the Burma Village Act, which, for purposes of crime control, discourages the erection of permanent dwellings outside the boundaries of the village site.

The agricultural year may be said to commence with the break of the rains in May. In the paddy tract, field huts are built and firewood stored during the slack months of April and May and the nurseries are got down by the first fortnight in June. Ploughing and harrowing the remainder of the holding and the transplanting of the main crop are carried on into August, and in some of the later districts, may extend even into early September. But from then onwards till the latter half of November, when the early paddies begin to ripen, there is little field work to be done.

Harvesting becomes general during the first half of December and by the middle of January most of the crop in even the latest districts is off the ground. Threshing and winnowing the paddy occupy the greater part of February and by March the bulk of the crop has found its way into the hands of millers and brokers, or into the godowns of traders in the towns and villages who hold it for a rise in the market.

In the dry zone, the operations and seasonal work are of course different and probably cover a greater part of the year. But in all tracts, except in some of the irrigated areas, there is the same alternation of busy and slack periods with a more or less general cessation of agricultural activity in the hot weather.

The size of the average holding varies a great deal with the district but is generally a simple multiple of the area which can be ploughed by a pair of bullocks. Especially is this the case in the Lower Burma paddy plains where agriculture has become industrialised into the production of a single crop mainly for export, and where mixed farming is unknown. In these tracts the general allowance is one yoke of bullocks to every twelve acres although this proportion may vary from eight to fourteen acres in heavy and lighter lands. In Upper Burma, where farming is more mixed and carried out on a less extensive scale, the area worked by one pair is fifteen acres, but the yoke of bullocks in Upper Burma plays a smaller part in fixing the size of a cultivator's holding. In the dry tract, we find very small holdings associated usually with garden cultivation or worked as a part-time occupation by a cultivator who has another non-agricultural source of income; but as a sole means of livelihood the diminutive holding, frequent in parts of India, is by no means common.

The Land Record Department has produced a Table which shows the size of the average holding in Upper and Lower Burma:—

	Under 5 acres	Over 5		Over 10		Over 20		Over 50
		Under 10	Under 20	Under 20	Under 60	Over 60	Over 60	
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
Lower Burma	57	16	15	11	4	
Upper Burma	62	20	12	5	1	

The figures in this Table, however, have little agricultural significance, for they refer only to complete holdings owned by individual landowners in arbitrarily fixed areas of about 600 acres called *krins*; the actual area worked by a cultivator as a farm unit with the assistance of his family and hired labour is more. This unit is given in several settlement reports for particular districts, and the Agricultural Department has recently collected figures throughout the greater part of Burma which indicate more nearly what this unit is. In Lower Burma, it is comparatively large but declines in size northwards through the drier zones. The following figures, although not based upon a sufficient amount of data to give reliable averages for whole districts, convey a better impression of the size of holding met with most frequently:—

Crops	Districts	Average size of holding in acres	Crops	Districts	Average size of holding in acres
Paddy ..	Hanthawaddy ..	67	Cotton ..	Myingyan ..	8.8
	Insein ..	40	Steamum ..	Thayetmyo ..	4.4
	Pegu ..	35	Sugarcane, beans ..	Yarmethon ..	14
	Tirrawaddy ..	17	Paddy ..	(Upper) Mandalay ..	7.0
	Thaton ..	81	Burman).		
	Bassein ..	34			
	Myauuungmya ..	25			
	Mabin ..	23			
	Akyab ..	17			

Quite large farms of 200 to 250 acres are found in Hanthawaddy, Pegu and Thaton districts worked by tenants on a yearly lease and, although these are not numerous, they demonstrate the system of agriculture which has been induced by the industrialisation of the paddy crop grown mainly for export.

The mention of tenants and hired labour indicates that peasant proprietorship is by no means universal in Burma. In an inquiry carried out into the condition of agricultural tenants and labourers by Mr. Couper in 1923, it was found that, in the places where figures were collected, an average of thirty-eight per cent of the land was worked on yearly tenancies and that in some townships it rose to as high as seventy-two per cent. This refers to Lower Burma where land is freely bought and sold by both agricultural and non-agricultural classes and where, by foreclosure, the small owner cultivator has frequently to part with his land in settlement of debts during a succession of bad seasons.

A small owner cultivator frequently rents additional land to work with his own, or he may hire out his own land and rent a larger holding to cultivate himself. The rents are almost always paid in kind and are fixed at so many baskets per acre usually representing from one-fourth to as much as one-half of the total produce. It is customary for the owners to pay the land revenue which varies from Rs. 1-8 to Rs. 4-8, Rs. 5 or Rs. 6 per acre according to the productiveness of the soil.

Tenancies are for a period of one year and the cultivator frequently changes his holding. Mr. Couper, for instance, found that out of ninety-nine cultivators, only twelve had been in the same holding for more than four years. There is no great sentimental attachment for family reasons amongst owners and cultivators to particular land; and, as already indicated, paddy land is regarded among owners almost solely in the nature of an investment to be bought and sold as occasion demands. Affection for a paddy field does not exist, but where dry land is concerned, as in Upper Burma, sentiment plays a more prominent part and frequent change of ownership are not so common.

Peasant proprietorship is the rule in Upper Burma, but in Lower Burma absentee landlordism with its attendant evils is a conspicuous feature of the paddy tracts. The larger landowners live in the towns and hire out their land yearly to the highest bidder. This instability of tenure acts as a severe handicap to progressive agricultural improvement, for the cultivator can never be sure at the beginning of a season whether he will get his own land back again, or, indeed, whether he will get any land at all. If he loses his holding he may become a labourer for the year and hire both himself and his bullocks to some one else; but this represents a drop in status to be remedied, if possible, in the succeeding year by again becoming a tenant should land be available.

In spite of the large holdings and the comparatively extensive form of agriculture pursued, there is, as yet, enough land to go round if fairly distributed. The density of the population varies, of course, from district to district, being greater in the rice lands of the delta and diminishing

in the dry zone and towards the hills. The delta, although comprising only fifteen per cent of the total area, contains thirty-seven per cent of the population and the more densely populated districts are naturally found in this sector. There are four dense patches in the areas influenced by the large towns of Rangoon, Mandalay, Moulmein and Akyab, but even here the population is sparser than is common in India. The most dense population is in Maubin district with 201 persons per square mile, and the least dense Myitkyina with a figure of only 11 per square mile. Dry zone districts vary from 51 in Thayetmyo to 179 in Sagyin, the latter coming to a certain extent under the influence of Mandalay.

With a comparative plenitude of land and the lack of any custom insisting upon the subdivision of holdings among the members of his family on the decease of an owner, fragmentation of holdings in the Indian sense constitutes at present no problem whatever in Burma. When an occasion for the division of a property arises, the land is generally sold and the proceeds divided.

The Burman cultivator stands high among his Eastern fellows in respect of literacy. Owing to the existence of Buddhist monastic schools in almost every village, the vast majority of the village boys are taught the rudiments of reading and writing. A heavy percentage lapses into illiteracy after such imperfect instruction, but those who remain literate into the adult stage constitute a proportion of the population which is more than three times as large as that in any other province of India. The 1921 census gives the following comparative figures :—

Average number of literates per 1,000, aged 10 or over

Males		Females	
Burma	India	Burma	India
570	161	123	23

The standard of literacy is not, of course, high, but the Burma figures include only those who are able to indite a simple letter to a friend ; and most cultivators are capable of signing their names to a document even though they may not be able to read it completely or entirely understand its contents. Within recent years there has been a great expansion of vernacular newspapers. These find their way into most of the villages, especially those near the main roads and railways, and the happenings in the outer world, the prices of cotton and paddy in the main towns and all the miscellaneous items of news that go to make up a vernacular newspaper are available to most cultivators. The newspapers are very widely circulated and extensively read, the more enlightened villager reading them aloud for the information of his less advanced brethren.

With the means at his disposal, the Burman cultivator cultivates paddy and other crops in an intelligent and fairly efficient manner. As a ploughman and paddy cultivator he is better than the average Indian immigrant ; his fields are cleaner and better planted, and he shows more discrimination in the selection of varieties best suited to his land. As, however, it takes eight men to reap the crop which five men have sown, the Indian labourer is in considerable demand at harvest time and a good deal of the crop is reaped by such casual labour on contract rates. As has been previously noted, the total number of immigrants to Burma by all routes during 1926 was 408,464, and although a very large number of these are permanently employed at the large ports and at the rice mills in the seaport towns, a considerable number seek only seasonal employment in the reaping of the paddy crop. In 1906, 342,597 emigrated back from Burma so that the balance of immigrants over emigrants was only 25,877. These become absorbed permanently in the industrial labour round the large cities, very few of them settling down in the country areas.

As he is able, as a rule, to obtain a comfortable living by his seasonal work, the Burman shows little inclination to exert himself to accumulate wealth, and thirst is not one of his marked characteristics. The Burman is notoriously generous and when funds are available money is spent freely either on religious objects or on giving entertainments for the amusement of his fellow villagers. When the money is gone, resort is had to the moneylender or landlord for the means of financing the next year's crop. On account of his light-hearted attitude to the accumulation of wealth, chronic indebtedness is almost universal amongst the cultivating classes and the greater the credit the greater usually is the debt which is incurred. When the cultivator borrows from the *chettiar* (a member of a Madras banking caste) on a strict business basis of security, the rates of interest vary according to the security tendered and are by no means as high as when he borrows from his landlord or village Burmese moneylender on the basis of repaying his debts in kind after harvest. The latter method of borrowing is most popular in the villages as the *chettiyars* are somewhat strict in demanding security and are now unwilling to advance money on land. Loans of this nature—that is, repayment of debt in kind after harvest—are taken during the cultivating season, the basis being a sum of money for which a hundred baskets of paddy are paid back in February. The following Table indicates the scale of repayment required :—

Loan taken in		Amount of loan	
May	..	Rs. 60 to 70	Repaid in February by
July	..	.., 80 to 90	100 baskets of paddy
August	..	.., 100	worth Rs. 100 to
September	..	.., 110	Rs. 170.

6. THE AGRICULTURAL DEPARTMENT.

The history of the Agricultural Department may be divided into three periods. The first is the period anterior to 1906 when agriculture was under the Director of Land Records and Agriculture. Under this administration, action on the agricultural side was spasmodic; there was no trained agricultural staff and a few government gardens under amateur enthusiasts represented the limit of effort. To these gardens, however, was due the introduction of the groundnut which has brought such great agricultural wealth to the province.

The second period dates from 1906 when a civilian Director of Agriculture was appointed. An agricultural chemist joined the staff that year and two deputy directors of agriculture were appointed in 1907. A period of acute financial stringency, in which the very existence of the department was threatened, followed by the outbreak of the great war, brought operations practically to a standstill and it was not till 1918 that a forward step could be taken. But even in this period two large experimental farms were opened at Mandalay and Hmawbi, and various smaller district farms of about twenty acres in extent for the trial under local conditions of new strains of seed produced on the central farms at Mandalay and Hmawbi. During this period, the posts of economic botanist and of third deputy director of agriculture which had been sanctioned were not filled and the idea of an agricultural college was abandoned largely on account of financial stringency.

With the cessation of hostilities, Government was in a position to devote more attention to the Agricultural Department and a comprehensive reorganisation scheme was sanctioned by the Secretary of State in 1919. This scheme was in general endorsed by a committee appointed by the local Government which reported in 1923, and as a result of the local Government's orders on that report, the department is now constituted as follows.

The department is divided into two sections, the one dealing with field experiments, district demonstration and propaganda and the other with agricultural teaching and research. For the purposes of field experiments and district demonstration, the province is divided into eight circles, each under a deputy director of agriculture. This excludes the Shan States for which it is hoped that two deputy directors will ultimately be appointed when financial circumstances permit. At present an arrangement has been made by which work in the Shan States is superintended by deputy directors of agriculture stationed in Burma.

It is the intention that each of these circles should ultimately have a central farm. Up to date five such central experimental farms have been opened at Hmawbi, Pyinmana, Myitkyina, Allanmyo and Akyab while the large farm at Mandalay, which is now the college farm, has up till now served the purposes of the Northern circle. Two more farms are now being equipped at Mudon in the Tenassarim circle and Myaungmya in the Irrawaddy circle and, with the selection of a central farm for the Northern circle, the chain of central farms will be complete. There

are also subsidiary farms for special crops at Pwinbyu, Padu, Tatkon, Thayetmyo and Kyaukpyu.

The main duties of the deputy director are research on the agricultural problems of his circle. His first duty is to discover what these agricultural problems are and, having found them, to experiment on the central farms with a view to finding a solution. When a solution has been found he must endeavour to have it introduced into the general agricultural practice of his circle by demonstration and propaganda. He is assisted in the work of his circle by an assistant director, who is a member of the Burma Agricultural Service, two senior agricultural assistants for demonstration and propaganda work and the supervision of subsidiary farms, and two senior agricultural assistants on the staff of each of his central farms. Great emphasis is laid on the importance of seed distribution and propaganda work. A considerable amount of this is done through the assistance of the Co-operative Department while in some tracts agricultural unions for the distribution of pure seed have been found very effective. The village or group of villages under a village headman is taken as the unit and in each union there is one or more privately owned seed farms which multiply pure strains for distribution to the individual members of the union. The necessity for the rapid multiplication of pure seed strains has been fully realised and it is the policy of the department to provide a connecting link between the central experimental farms and the agricultural unions or co-operative societies by the provision of seed farms in the areas where pure seed can be rapidly multiplied. In pursuance of this policy a number of areas, varying from 50 to 100 acres, have been taken up by purchase or by exclusion from grazing grounds so as to provide as large a number of such farms as possible. These will be let out to approved tenants of the Agricultural Department who will be responsible for the maintenance of the purity of the seed and, to a large extent, for its distribution. Some of these farms in the more important centres will be equipped with seed godowns and quarters for an agricultural assistant and fieldman so that the growing of the pure seed crop can be kept under the closest observation.

As has been pointed out above, the department was only organised in 1919 and the full recruitment of a superior staff sanctioned under that scheme was not completed till 1923. The result is that the work of the department is still largely in the experimental stage, and it is only in the Southern and Northern circles, which existed prior to 1919, that it has been possible to develop work on any organised scale. At the same time a few outstanding results have been achieved. For instance, in the Myingyan circle, which is one of the main cotton tracts of the province, a high yielding strain of cotton with a ginning percentage of 36% against the ordinary 31 to 32 per cent is under distribution and seed has been given out for 5,000 acres. Both the *kapas* and lint of this strain can be disposed of at a premium of Rs. 5 per 100 viss,* but at present the crop is bought back by the department, ginned by them and the seed

* The viss = 1.0 lbs.

distributed by sale to cultivators. Further promising varieties have been obtained by selection and hybridisation. These have been submitted to the Cotton Technological Research Laboratory, Bombay, for spinning tests and as these have proved satisfactory the varieties will be thoroughly tried out under field conditions.

In the Lower Chindwin area the gram crop was practically wiped out by a wilt disease and the devastation was so general that Burmans called this area the "gram cemetery." By the introduction of an immune variety the Agricultural Department has totally replaced the local crops.

The work of the Central circle with headquarters at Pyinmana is largely concerned with sugarcane. A central farm of 54 acres was acquired in 1924 and the buildings and equipment have just been completed. The duties of its deputy director will be an intensive study of sugarcane in all its aspects and although too little time has elapsed for any particular results to be achieved, the existence of the farm has resulted in the introduction of sugarcane into several new areas in the neighbourhood. There is a ready demand for all available supplies of exotic canes for planting.

The central farm of the West Central circle is located at Allanmyo and extends to 143 acres. Its concern will largely be cotton and the improvement of the Lower Burma strain of that crop. In this circle two subsidiary farms have been opened, one for the study of tobacco and the other for irrigated rice in the Mon Canal area. From this farm, which has been in existence for a number of years, improved strains of paddy have been introduced in the Mon Canal area. The total seed distributed to date is 213 tons and there are now 52 private seed farms multiplying the strains for distribution.

The Southern circle dates back to the earliest days of the Agricultural Department and at that time was responsible for practically the whole of the experimental work for Lower Burma. Its field of operations has now been considerably restricted. The area of the farm is 450 acres—400 acres of rain-fed paddy land and 50 acres of garden land. The main object of the farm is to investigate problems connected with the cultivation of paddy under Lower Burma conditions, and, in particular, to improve the quality and yield of varieties suited for the export trade. Pure line selection from indigenous races has been the method adopted to improve the paddy varieties grown in the country and no less than 1,043 strains in all have been dealt with. As a result, seven improved strains of paddy are at present being distributed to suit most of the conditions met with in Lower Burma. The amount of pure improved seed issued from this farm last year and from its attached seed farms was 550 tons, sufficient for 24,652 acres. In addition to this work of selection, experiments on the manurial requirements of the soil and the utilisation of indigenous manures have been carried out, as also experiments in seed rates and methods of planting. The central farm has a ring of seed farms around it to demonstrate the results obtained on the farm to the cultivator in the district. Twenty seed farms, totalling 1,216 acres, have been opened and ten more farms, totalling 532 acres, will be opened

shortly. In addition, it is proposed to open two larger seed farms equipped with godowns at two of the main centres. These larger farms will have an area of 153 acres and 125 acres respectively and will act as the main centres of seed distribution of the two outlying halves of the circle. In the three other circles, the Irrawaddy circle, the Arakan circle and the Tenasserim circle, little progress has been made as these circles have only recently been constituted and the farms have not yet been fully equipped. In the first two the improvement of paddy will be the principal problem, and in the Tenasserim circle, although this will also be the principal crop, fruit and coconut will occupy a good deal of the attention of the deputy director.

The scientific research work of the department is concentrated at the Agricultural College and Research Institute at Mandalay, the research officers being also professors in their subject at the Agricultural College. In the field of agricultural chemistry the agricultural chemist has for many years been engaged in an investigation into the prussic acid content of Burma beans (*Phaseolus lunatus*). This enquiry was forced upon the department by the trade as one or two unfortunate accidents in feeding cattle, which had been attributed to Burma beans forming a part of their diet, had very seriously affected the market for this product. After many years' study the conclusion arrived at is that the prussic acid cannot be eliminated from the beans by selection and the efforts of the department are now being devoted to research for a substitute. The work has now been handed over to the economic botanist who has under trial 80 varieties of indigenous and exotic beans with a view to finding prussic acid free substitutes for the Burma beans of commerce.

From time to time a large amount of work has been done on soil surveys and systematic surveys of two districts are now in hand. The object is to discover, if possible, a co-relation of soil types with paddies particularly suited to such types, a work which when successfully completed will be of permanent value. Apart from these systematic surveys detailed surveys have been made of all the government farms and a large number of surveys for private applicants. Another line of work is a series of analyses with a view to investigating the possibilities of the manufacture of citric acid and the extraction of essential oils. An investigation of some interest and of a rather peculiar nature was undertaken by the agricultural chemist at the instigation of the Department of Public Health. Frequent complaints were received that the process of parboiling of paddy amounted almost to a nuisance to the neighbourhood in which the operation was carried out on account of the supposed noxious gases which were given off in the process. The problem has been completely solved and the improved process has been adopted by European millers and others in Burma. It is understood that it has also been taken up in the Federated Malay States, in Siam and in Ceylon. In addition to these particular lines of investigation a great amount of work has been done in the analyses of soils, manures, fertilisers, oil-seeds, etc., for the Agricultural Department and for other departments of Government and the public. It may be noted that great difficulty has been experienced in recruiting suitable trained assistants for the

subordinate staff. But this state of affairs will doubtless be remedied when the Agricultural College begins to function.

Until the arrival of an economic botanist a large amount of botanical work was done by the deputy directors in Upper and Lower Burma. Now that an economic botanist has been appointed to the staff he has been given a separate area and establishment on the college farm at Mandalay on which all the plant breeding and selection work in connection with rice and various dry zone crops is carried out. The area devoted to plant breeding and selection is 20 acres and in connection with the college a teaching garden containing representative species of the various natural orders is being laid out while a fruit garden will also be opened for purposes of instruction. In addition to this, the economic botanist has free access for work to certain of the central farms. Work at present is being mainly devoted to paddy, wheat, gram, beans and sesamum, but here again, as in the chemical section, much difficulty is experienced in getting a trained staff of assistants.

A mycologist was appointed to the staff in 1923 but the college laboratories for his accommodation were not completed until 1924. A beginning has been made with the study of various fungus diseases of sugarcane, sesamum, *juar*, wheat, gram, cotton, betel vine and groundnuts, while a considerable amount of advice has been given to rubber companies and to sugarcane, tea and coffee estates.

An entomologist (who is a member of the Burma Agricultural Service) deals, so far as he can, with the vast number of insect pests to which the crops of Burma are subjected. Considerable success has attended efforts to deal with palm beetle and with land crabs both of which are serious pests of the province. Attention has also been devoted to lac culture, the object being to work out a practical method of growing lac on cultivated plants for cultivators in the plains while some experiments have also been carried out in bee-keeping. The most important part, however, of the work of the entomologist has been in connection with sericulture. Here the lines of work have been first to find out a multivoltine race of worms suitable to local conditions. Considerable success has been achieved in this direction, two strains having been obtained which are wholly multivoltine and give a much higher yield of silk. The other main objects are to work out the best method of growing mulberry under the varying conditions in the hills and plains of the province and to study the economics of the industry from the point of view of the rearer. Efforts are being made to foster the industry by the supply of mulberry cuttings and seedlings and of eggs or seed cocoons of improved races which have been examined and guaranteed free from disease, while the question of rearing has also been taken up and efforts made to introduce the industry into new districts.

The agricultural engineer is fully occupied with the routine work of the department and with the manufacture of improved implements, water-lifts and other agricultural appliances. A new type of plough has been designed and put on the market. At present these are manufactured in England, but a local blacksmith at Pyinmana is also turning out these ploughs in quantity for local sale and to supply orders

from the Agricultural Department. There seems no reason why the manufacture should not ultimately become local. The manufacture of improved water-lifts, introduced by the agricultural engineer, has been taken up by certain village carpenters and they are being sold freely. A new type of jaggery-boiling furnace has also been designed which is capable of burning the dried stems or megass. This effects a very marked economy in fuel. In addition to his actual work on agricultural machinery the agricultural engineer has also the supervision, in some cases, of the construction of the smaller departmental buildings on the farms.

It is to be regretted that practically no progress has been made in the matter of stock breeding or dairying, but it is now proposed that the Tatkou farm should be devoted to cattle breeding, the object being to build up a herd of pure Burmese cattle and also to conduct certain experiments in cross-breeding.

An interesting feature has been the establishment of agricultural improvement committees which have been formed in five districts. These are largely non-official though for the time being the deputy commissioner of the district or the deputy director of agriculture acts as chairman. The functions of these committees are mainly advisory and may be defined as follows:—

(1) The committees act in an advisory capacity to Government in general and to the Agricultural Department in particular in matters relating to the agricultural improvement and development in a district.

(2) The committees arrange for the holding of shows and exhibitions in the district.

(3) The committees make recommendations with regard to the grant of loans or grants-in-aid under the Land Improvement Loans Act and carry out such other duties as may be referred to them from time to time by the local Government.

The main results achieved by the department up to date may be briefly summarised as follows. It is estimated that 200,000 acres of rice in the provinces are under selected varieties distributed from the Hmawbi and Mandalay farms. The superior value of this rice is now recognised by the market both in London and on the Continent. It is free from the objectionable red grain, is of a uniform shape and consistency and when milled gives an increased outturn which averages about three baskets of white rice per hundred baskets of paddy milled. Premiums are paid by millers of all classes for paddy grown from the Agricultural Department's seed, these premiums varying from Rs. 5 to Rs. 15 per hundred baskets* of paddy.

In certain parts of Upper Burma, the grain crop was almost entirely eliminated by the fungus *Fusarium udion*. The soils had become so impregnated with this disease that it was impossible to grow the crop more than one year on the same ground. The Agricultural Department tackled the problem and, after experiment with varieties received from every province in India, a variety from Karachi which was found to be

* Baskets vary but average weight is 40 lbs.

fairly immune was placed under selection with the result that a completely immune strain was evolved and seed multiplied. In 1923, enough seed of this immune variety was distributed to sow 28,000 acres. The distribution has continued with the result that the old variety has been completely ousted. The Director estimates that the annual money value of this piece of work is nearly as much as the present expenditure on the whole department.

In cotton, work has hardly advanced beyond the experimental stage but the selected varieties with a higher ginning percentage have been distributed and 5,000 acres sown with this seed. Cambodia cotton has also been introduced and distributed in suitable areas, the total area now being about 6,000 acres. Similarly new types of groundnut, showing an increase of 15 per cent in the oil content and much easier to harvest than the local varieties, have been successfully introduced. Considerable improvements have also been effected in agricultural machinery.

With regard to agricultural education, as has been noted above, the idea of an agricultural college was for financial reasons kept in abeyance until it was revived in the reorganisation scheme of 1918. During this period and until the completion of the college, the province had to rely upon the friendly offices of the Government of Bombay for the training of its subordinate staff and by an arrangement with that Government large numbers of students were trained at the Poona Agricultural College. The Agricultural College at Mandalay was formally opened by His Excellency the Governor, Sir Harecourt Butler, in December 1924. It is well equipped with laboratories which provide ample accommodation for teaching and research in agricultural chemistry, botany, mycology and entomology, while instruction is also given in English, mathematics and physics. There is also an excellent library. The early experiences of the college have not been too happy. Apart from research its primary object was laid down as the instruction of a staff for the Agricultural Department. It was at first proposed to hold a four-years' course leading to a diploma and when the course commenced in 1924 stipends were given to 24 students, for the most part possessing the high school qualifications, with a promise of employment in the upper subordinate establishment in the event of their obtaining a diploma. It was also intended to introduce a shorter two-years' course for candidates for the lower subordinate establishment. The high school final qualification, however, was not found to be satisfactory, the standard being too low and an attempt was then made to substitute a three-years' course with I.A. or I.Sc., as a standard of entrance. The intention was to affiliate the college to the Rangoon University but the scheme had to be abandoned almost immediately owing to the paucity of candidates that applied. A three-years' diploma course is now being started. At the beginning of March, 1927, there were 11 third year students, 15 second year students and 20 first year students taking this course.

Apart from the courses of instruction at the college, special short courses are held at central farms to provide practical instruction for cultivators and their sons. These courses are designed to give practical

instruction in the use of improved implements and to demonstrate improved methods. Stipends are also offered to the sons of cultivators and landowners to enable them to undergo training for longer periods on the central farms.

Outside of government effort, the only other attempt at agricultural education in the province is the Pyinmana Agricultural School—a vernacular school conducted by the American Baptist Mission. Government give grants for building construction up to half the total cost or Rs. 75,000, whichever is less, and a yearly grant for recurring expenditure increasing from Rs. 2,200 to Rs. 18,000. The aim of the school is to give an agricultural education to village boys who have completed the fourth standard of the vernacular primary school. Instruction is entirely in Burmese although English and literary subjects of the middle school course are also taught. The total area of the school farm is nearly 180 acres and the buildings are nearing completion. There were, in 1927, 62 students in the school, but there will be accommodation for 120 when the buildings are completed.

The following statement shows the receipts and expenditure under "Agriculture" for the ten years 1917-18 to 1926-27:—

Year	Receipts			Expenditure
	Rs.	Rs.	Rs.	
1917-18	17,328
1918-19	20,602
1919-20	31,176
1920-21	20,810
1921-22	31,480
1922-23	40,563
1923-24	51,030
1924-25	61,067
1925-26	57,207
1926-27	62,741

7. THE VETERINARY DEPARTMENT.

The Government of Burma devoted some attention to veterinary matters long before the question of an agricultural department was considered. Thus as long ago as 1876 we find that there was a veterinary instructor in the province and from 1884 onwards a certain number of veterinary assistants. The staff of veterinary assistants rapidly increased until, in 1906, there were 120 with 10 inspectors, 5 deputy superintendents and 3 superintendents. At the end of 1926 there were actually employed 3 superintendents, 7 deputy superintendents, 1 assistant instructor, 22 veterinary inspectors and 226 veterinary assistants.

The special committee which recently investigated the Agricultural Department reported also on the Veterinary Department and on their

recommendations the Government have passed the following orders. The province will be divided into four circles and nine sub-circles, the former being under superintendents and the latter under deputy superintendents. The cadre of the Burma Veterinary Service (Provincial) will be increased from nine to fifteen, nine to be employed in charge of the sub-circles in the district and six at the Veterinary College at Insein. Veterinary inspectors will be increased to twenty-eight and veterinary assistants to two hundred and eighty on pay ranging from Rs. 50 per month to Rs. 150. Simultaneously the standard of education required for admission to the Insein Veterinary College will be raised to the high school final. At present veterinary assistants are appointed after passing a three-years' course at the Veterinary School at Insein. Inspectors are recruited partly by promotion from the rank of veterinary assistants up to two-thirds of the cadre of inspectors and the remainder from amongst students who have taken a diploma at the Calcutta Veterinary College. These students were sent to the Calcutta College with stipends by the local Government. Deputy superintendents are selected from among Calcutta-trained graduates and in rare instances by the promotion of vernacular veterinary inspectors. The province is divided into circles controlled by superintendents of the Indian Veterinary Service and these circles are divided into sub-circles controlled by deputy superintendents. The scheme aims at two veterinary inspectors for each sub-circle and one veterinary assistant for each township. A certain number of assistants are kept in reserve for emergencies or to control frontier stations. District councils are in theory responsible for the health of cattle in their districts but veterinary assistants are paid from provincial funds which also pay for their travelling allowance. They are lent to the district council for the districts to which they are posted. District councils pay their contingent expenses and copies of all diaries go to the chairman of the district council. The head of the Veterinary Department has the power to transfer veterinary assistants from one district to another. In Burma, the duties of the staff are largely determined by the Cattle Diseases Rules, 1914, which apply practically to all areas in which the Burma Village Act of 1907 is in force. Under the Burma Village Act the registration of the death of cattle is compulsory and must be done by the owner within 48 hours of the death. The Cattle Diseases Rules of 1914 lay down clearly the responsibilities of villagers in cases of outbreaks of cattle disease and as to treatment of the carcasses and skins of cattle that die. The system followed in Burma is that of the peripatetic veterinary assistant. There are only four veterinary dispensaries in the province and the public seem to evince little enthusiasm for them. The vast areas of the agricultural districts and the difficulties of moving cattle militate against any wide development of the principle of the stationary dispensary and it is thought that more good is done by the veterinary assistants moving freely from village to village with supplies of medicine and attending to cases in the course of their tours.

In 1923, Government appointed a committee to investigate the question of the Insein Veterinary School and its future. As a result, the school is now being completely reorganised as a teaching and research college.

When this reorganisation is completed, Burma will be independent of other provinces for training its superior staff. A building scheme involving an expenditure of slightly over Rs. three lakhs has been put in hand and the buildings are nearing completion. It is intended that the college should be fully equipped with laboratories both for teaching and research. The entrance standard proposed is the high school final followed by a three-years' course at the college and accommodation has been provided for eighty students. If the standard is kept sufficiently high it will be possible to train students at Insein for admission to the Burma Veterinary Service.

8. IRRIGATION.

Burma is so bountifully blessed by Nature in the matter of rainfall that it is only in the dry central zone that irrigation is of any importance. It may be said that where irrigation is available it is entirely directed to rice cultivation. In fact this crop represents ninety per cent of the whole area under irrigation. On the four major canals of the province no less than ninety-nine per cent of the land irrigated is under rice. It is only in the Kyaukse district that irrigation is devoted to any extent to crops other than rice and this district accounts for about half of the total irrigated area under crops other than the rice crop. Here also a certain amount of double cropping is done, sesamum being sown over a large area before a late rice crop is taken off.

Irrigation was practised by the Burmans long before the British occupation of the country and in fact has been known in the dry zone of Upper Burma from time immemorial. The physical formation of the province militates against irrigation schemes of any magnitude but smaller schemes can be multiplied and the area irrigated in Upper Burma has been trebled since 1901. In many cases, the work has consisted of the realignment and remodelling of schemes originally started by Burman agency.

Irrigation works in Burma were reclassified in 1926 and for purposes of comparison this reclassification may be applied as having existed from 1891, the year from which reliable records are available. The classification is into two groups (1) productive works for which capital accounts are kept, (2) unproductive works for some of which capital accounts are kept and others for which capital accounts are not kept. The first group includes the Shwebo and Mon canals, constructed between 1901 and 1911, and the more important of the indigenous works—the Kyaukse Canal, the Shweinchaung Canal, the Man Canal and the Meiktila Lake. The second group embraces the Mandalay and Yeu canals, the Salin Canal, the Nyaungyan-Minhlila Tank and the Kyaukse Tank, for which capital accounts are kept, and all the numerous petty canals for which no accounts are kept.

The average annual irrigation area for five-year periods has increased from 238,331 acres in the quinquennium 1891-95 to 737,883 acres in the quinquennium 1921-25.

The irrigation done by the four major canals has increased from 358,997

acres in 1921 to 406,472 acres in 1925. The area irrigated by productive capital works (group 1) has increased between 1900 and 1925 by 325,168 acres or 206 per cent; that by capital unproductive and non-capital (group 2) by 196,389 acres or 214 per cent. In 1901, the milage of government channels open for irrigation was 593; in 1925 it was 1,717 miles, representing an average increase of 45 miles per annum over 25 years.

The total capital outlay—direct and indirect—on productive works in operation till the end of 1925-26 has been Rs. 1,86,25,709. The percentage of profit on capital outlay (including interest on capital outlay) has been 4.34 per cent and the total income, including water rate and miscellaneous receipts and share of land revenue due to irrigation works, has been 7.72 per cent on the capital outlay. The corresponding figures for unproductive works for which capital and revenue accounts are kept have been Rs. 1,47,96,785 capital: 1.05 per cent profit on capital outlay and 2.48 per cent profit when the total income—direct and indirect—is included.

The four major canals were originally constructed from funds supplied by the Government of India. In 1921-22 the Government of Burma purchased them for Rs. 2,20,98,665 and the revenue from irrigation is now entirely provincial. No water rate is charged. A consolidated rate is levied on all irrigated areas, the Irrigation Department receiving in some cases a credit of a percentage of the consolidated rate and in others the whole rate less a fixed rate credited to land revenue. The object aimed at is to simplify collection of the revenue and it has worked well. In the Shwebo Canal area, the canal revenue staff, whose duties consist of seeing to the distribution of water and checking areas irrigated, has been amalgamated with the land revenue staff and it is proposed to extend this system to other districts. The policy is to amalgamate the irrigation revenue staff and the land-records staff so far as this is possible and so effect economies in revenue collection. Up till now the revenue has always been assessed and collected by the revenue officers.

In a country like Burma where there are so many natural waterways and where the control of these natural waterways and protection against flood are of almost equal importance with that of the provision of water through irrigation channels, it is but natural that a great deal of the work of the Irrigation Department is devoted to questions of navigation and embankments for the prevention of floods.

On the side of navigation there are two important canals in Lower Burma maintained by the department which are of great importance in the commercial development of the province and on which tolls are levied by Government. The first is the Pegu-Sittang Canal completed in 1877-78 and the other the Twante Canal completed in 1916-17. The former canal connects the Sittang with the Pegu river and enables timber from the Sittang Valley to be floated to Rangoon via the Pegu river. It also carries a considerable traffic of rice, vegetables, bamboos and firewood. The Twante Canal carries a very heavy traffic in rice from the delta districts to the Rangoon mills and also provides a short cut for river steamers coming from the delta to Rangoon. The Pegu-Sittang Canal

has never paid for its upkeep directly, though it is a very useful water-way and probably makes indirect contribution to the revenues of the province by the commercial advantages which it gives. In 1925-26 the gross revenue was Rs. 1,93,141, the working expenses being Rs. 7,65,972. The Twante Canal, on the other hand, brought in Rs. 5,77,421 in the same year, the working expenses being Rs. 3,60,562 and the net revenue Rs. 2,16,859 representing a profit percentage of 4.2 on the capital outlay. This canal was constructed from funds supplied by the Government of India, but it was purchased by the local Government in 1921-22 for Rs. 45,64,692.

In Upper Burma, the only navigation canal of any importance is the Shwetachaung Canal in the Mandalay district which combines the functions of an irrigation and a navigation canal. This has never been a considerable source of income to Government and, as a metre gauge line is being constructed parallel to the canal and it is proposed to construct a metal road along the canal bank, it is likely to cease to be used as a navigation canal for the carriage of goods by water.

Within recent years nearly twenty-five lakhs of rupees have been spent in cutting new waterways and improving existing ones in the Irrawaddy delta to facilitate communications between stations in the delta and Rangoon and expenditure approximating to Rs. 16 lakhs is in contemplation. All these improvements, while they give no direct return, facilitate the movement of agricultural produce to market and materially improve the trading conditions of the country.

The third branch of the activities of the Department of Irrigation is concerned with embankments, the majority of which are regarded as productive as the department receives a credit of fifty per cent of the gross land revenue demand on the areas protected by them. These embankments have been in existence for many years, the Maubin Island and the main Irrawaddy embankments dating back to the early 'eighties.' The capital cost of the seven embankments which are regarded as productive was Rs. 48,86,617, protecting in 1921 an area of 818,891 acres and yielding a net revenue of Rs. 5,84,116. These figures show a return of nearly twelve per cent on the capital cost of the works taken collectively. In addition there are numerous small protective works up and down the delta which are regarded as unproductive and in many cases small embankments have been made and are maintained by the cultivators themselves.

Finally, it only remains to remark that great attention is now being devoted to projects for improving the drainage of areas liable to floods. An interesting system of river training without embankments has been evolved by Messrs. F. A. Leete, C.I.E., and G. C. Cheyne, M.B.E., and gives every prospect of permanent success.* The result of this comparatively inexpensive method of river training is to reclaim annually large areas of land suitable for cultivation by a regulated deposit of silt

* "Regulation of Rivers without Embankments." Published by Messrs. Crosby Lockwood and Son, Stationers' Hall Court, Ludgate Hill, London. 1921. Price 30 shillings.

from the streams. Extensive surveys are being made all over Lower Burma with a view to estimating what further steps can be taken to improve the drainage of these flooded tracts.

Reference may also be made to the hydro-electric survey of the province. A rough general survey has been carried out, but a more detailed investigation of certain areas is being undertaken, especially with reference to the provision of a hydro-electrically directed water supply for the city of Rangoon. In this enquiry attention will also be devoted to the possible industrial utilisation of the power generated.

9. FORESTRY IN RELATION TO AGRICULTURE.

The latest report of the forest administration in Burma gives the total area of forest land as 148,376 square miles or two-thirds of the whole province, of which 116,916 square miles are unclassed forests and 31,460 square miles are reserved.

In unclassed forests the control of the Forest Department is generally limited to the protection of certain species, principally teak. For the reserved forests, the Forest Department is directly responsible for the entire management. Little attention can be devoted to the unclassed forests and in consequence promiscuous grazing and unregulated extraction of forest produce are rapidly depleting them of useful growth with the result that they are steadily deteriorating. In the more remote and less accessible forests, the objectionable custom of *taungya* or shifting cultivation, carried out by wandering tribes of cultivators, is having a most deleterious effect on the forests.

In the case of reserved forests, the interests of the cultivators are safeguarded by the forest settlements at which the settlement officer lays down the amount of bamboos, thatch or other forest produce which can be removed under the settlement by the villagers in the vicinity. In 1925-26, the value of produce, including grazing, removed from the reserved forests under the rights and privileges conferred by the settlements was Rs. 2,65,000 and timber for use for house building and other produce granted free under the similar arrangements was valued at Rs. 1,98,000. This, however, by no means represents the total benefits derived by the cultivators from the forests as naturally they take the bulk of their supplies from the unclassed forests which are not under control and no records of such extractions are kept.

It may be noted that apart from direct benefits derived by cultivators from the free utilisation of forest produce, the principal benefit which forests confer on agriculture in Burma is the amount of work provided for the agricultural population in these forests. It may be said that labour required for the trade extraction of timber is almost entirely supplied by the agricultural population. About a million tons per annum are extracted at an average cost of at least Rs. 25 per ton and a very large amount of this total sum of 23 crores of rupees passes into the hands either of agriculturists who work in the forests in their spare time or of members of agricultural families who can be spared for more continuous

work in the forests. In addition, the constant demand for bamboos for building and for fuel and other minor forest products gives constant part-time employment to the agriculturists while the labour required for the various works necessary for the improvement and maintenance of the forests is supplied almost entirely by agriculturists in their spare time. In fact, in a country where all the houses outside of the larger towns are built of wood and bamboos and roofed with thatch the relations between the agriculturists and the forests are of the closest and not unnaturally the bulk of the work in connection with the extraction of these products is conducted by the agriculturists themselves. The Chief Conservator of Forests estimates the average annual requirements of the rural household in forest produce at, timber 50 cubic feet, firewood 250 cubic feet, bamboos 300 cubic feet, thatch 400 bundles and in practically every case the requirements of the small agriculturist are extracted and handled by himself. The records for grazing show that, during the year 1925-26, only 5,402 buffaloes and 26,474 cows and bullocks availed themselves of grazing on payment. On the other hand, over 150,000 buffaloes and over 340,000 cows and bullocks enjoyed grazing in forests by rights conferred upon the cultivators under the settlement, while a certain amount of free grazing was also granted during the pleasure of Government or otherwise than under the settlement.

At present, it cannot be said that the conflict between agriculture and forests is acute though in the more densely populated parts of Lower Burma there is constant conflict between cultivation and forest rights when applications for the throwing open of a fuel reserve to cultivation come up. Any proposal to throw open a fuel reserve to cultivation is almost invariably opposed by a public opinion equal in strength to that which demands transfer to cultivation and the maintenance of the balance between the conflicting interests of agriculture and forestry will become increasingly difficult as the population increases and as the forests near villages become depleted of the produce which the agriculturist requires for his local needs. The present position may be summed up in the statement that at present the supply of forest produce is generally inadequate, but the accessible areas of supply outside reserved forests are being rapidly depleted before the demands of cultivation, grazing and wasteful exploitation. The people now have to go further afield for their supplies and in many cases this has involved such a burden that a recognised trader in forest produce replaces the old system by which the individual extracted his own requirements. In these circumstances, the policy of the future contemplates the gradual absorption of the vast areas of unclassed forests so far as this can be effected either by reservation or by allotment as village waste for the use of definite village communities. The definite allotment of land as village waste has the advantage that the villagers concerned will have the right to protect such land, a right which at present they do not enjoy. In order to meet the increased demand on the reserved forests which has arisen within recent years, considerable attention is being devoted to regeneration and planting up operations. On the general relation between

forests and agriculture in Burma, the Chief Conservator writes as follows :—

“ Where the interests of forestry conflict with those of agriculture the problem of correlating them is not always easy. It is accepted as axiomatic that land suitable for permanent cultivation should be released for the purpose unless there are exceptionally strong reasons for retaining it under forest. On this policy the bulk of the reserved forests have been relegated to the hills and those in the plains have been restricted in area to what is essential to supply the wants of the surrounding population. Pressure of population upon the soil is responsible for periodical demands to eliminate the limited blocks of forest that have been retained in the plains. It is, however, generally recognised that a cheap and accessible supply of forest produce is a necessity to the peasant proprietor and this supply cannot be made available unless there is a proper provision for the maintenance of land under forest. A recent careful enquiry into the status of the reserves in the plains on either side of the Pegu Yomas has shown that, when the matter is properly examined, both the district authorities and the people themselves are fully alive to the value of these reserves in the rural economy. In the case of the reserved forests on the hills the demand to push back their boundaries has not arisen and is unlikely to arise in the near future in view of the low agricultural value of the land and in the face of our present policy of working the accessible portions primarily for the benefit of the local people. There will, however, arise at intervals a clamour against the restrictions imposed by forest regulations. In resisting this, much will depend on the extent to which people can be educated to realise the necessity for conserving supplies and to understand that restrictions in the methods of extracting and utilising forest products are necessary for conservative management. The ideal position would be to have portions of the communal lands set aside for the production of forest crops and managed by co-operation under State supervision. Under existing conditions, bamboos are frequently planted as a garden crop, and occasionally an enterprising individual has planted catch trees for use as house-posts and fuel. There has, however, been little system and no co-operation in the matter, and until these materialise any reduction in the accessible areas of our reserved forests would be a very short-sighted policy, both from the point of view of the State and that of the agriculturist.”

10. GENERAL EDUCATION.

The latest report of the Director of Public Instruction shows that the percentage of scholars to the total population in 1921 was 7.01 males and 2.66 females or a percentage total for the province of 4.89. The province has one university consisting of two constituent colleges, the University College, Rangoon, and the Judson College, Rangoon, and an Intermediate Arts College at Mandalay. For males, there are 149 high schools with 40,251 pupils, 1,214 middle schools with 128,483

pupils, 3,913 primary schools with 207,666 pupils and 827 special schools with 13,756 pupils. For females there are 25 high schools with 6,123 pupils, 118 middle schools with 13,306 students, 606 primary schools with 31,171 pupils and 32 special schools with 715 pupils. In addition to this there are 18,449 unrecognised institutions with 202,670 pupils. It may be remarked that the monastic system of education takes a very large place in the education of the rural population. 1,124 of these schools with 72,794 pupils are on the aided list and in addition there is a very large number of private monastic schools roughly calculated at 17,392 with 177,849 pupils. From the point of view of the Education Department these schools are of no great value in the strict educational sense but it cannot be denied that they contribute very largely to the literacy of the province. Thus the census figures for 1921 show an average proportion of literacy over the age of ten as 576 for males in Burma in every thousand as compared with 161 in India, and 123 females in Burma as against 23 in India. It is to be feared however that, as in India, the bulk of the pupils go very little further than standard II. In these circumstances the possibility of introducing agricultural teaching into the ordinary schools of Burma seems very remote despite the higher general standard of literacy in the province. There has, in fact, been no attempt at teaching agriculture in ordinary schools beyond an experiment with school gardening which failed in its object because it was regarded as a vocational subject and not merely as an effort to introduce some pleasant variety into the school curriculum. As a college of agriculture has only recently been opened in the province, no serious attempt has yet been made to tackle the question of agricultural education in other institutions.

The total expenditure on education in 1926-27 was Rs. 1,93,83,801, nearly 211 lakhs of rupees more than in 1925-26. Of this Rs. 91,26,512 was met from provincial funds, Rs. 25,41,805 from local funds and Rs. 9,59,463 from municipal funds. The balance is met from fees, funds of the Federated Shan States, and payments by missions or managers on account of their share in the maintenance of schools which receive grants-in-aid. It may be remarked that over fifty per cent of the expenditure shown under local funds was contributed by provincial revenues. As in other provinces of India, education is a matter in which the local legislature takes the keenest interest and progress both in expenditure and in the raising of the standard will be rapid.

11. CO-OPERATION.

The co-operative movement is one of great importance and statistics of the movement may be of interest. At the end of June 1926 there were 5,383 societies of all kinds with a total membership of 147,264. The total amount of working capital, excluding sale and insurance societies, was Rs. 4,74,83,833 and the total expenditure on management Rs. 16,48,435. During the last few years, there has been a considerable weeding out of unsatisfactory societies and the number of societies and of members shows some reduction over the last four years.

The apex institution of the movement is the Burma Provincial Co-operative Bank Limited, with headquarters at Mandalay and branches at Rangoon, Thaton and Bassein. The capital of the bank is made up of shares of Rs. 100 each held by individual shareholders and shares of Rs. 100 held by constituent societies and the capital of the bank, at the close of the financial year 1926, was Rs. 6,61,540. Fixed deposits are received from the public at rates of interest which are varied according to the requirements of the bank, but run about 5½, 6, 7 and 7½ per cent for one, two, three or four year deposits. The bank, at the close of the financial year 1926, held fixed deposits of Rs. 85,62,002. An important source of finance also are the deposits in its saving bank section which undoubtedly have induced a spirit of thrift among the people. In addition, certain co-operative societies also deposit their reserve or surplus funds in the provincial bank and over 7½ lakhs were made available from these sources during the year. The bank has investments in Government paper of over 33½ lakhs. The Provincial Bank as the apex bank of the system provides fluid reserves for all district banks, town banks and urban societies which seek its assistance and its branch banks at Rangoon, Thaton and Bassein undertake the duty of financing credit societies in their local area and also of attracting local capital.

In addition to the Provincial Bank, there are 23 central banks which perform for small areas the functions of the Provincial Bank from which, if local supplies of capital are not ample, they can obtain funds. Omitting money lent by societies of one class to societies of another class, the net amount of working capital in these central banks was at the end of June 1926 Rs. 49,80,225 and they showed a profit on working of Rs. 1,29,191.

As in other provinces, the most important and most numerous class of society are the primary agricultural societies, of which there were at the end of June 1926, 3,919 pure credit societies, 111 tenancy co-partnership and credit and 2 land mortgage societies. These credit societies are of course the base of the whole movement and engage most of the time of the administrative staff. Primary credit societies have a total membership of 87,781 and a share capital of Rs. 37,57,386. The profit for the year amounted to Rs. 3,59,420. The average loan at the end of the year under report was Rs. 197. Above these primary societies are unions for supervision and guarantee numbering 569. These exercise supervision, inspection and primary audit.

In comparison with credit societies, progress in other directions has not been great. For instance, there are only twenty-one agricultural and six non-agricultural purchase and sale societies. There are six agricultural production societies and three non-agricultural production societies. There are 395 cattle insurance societies, confined entirely to five districts in Upper Burma, but it cannot be said that they are very active. It is in district agricultural and co-operative associations and union group boards that the link between co-operation and agriculture is strongest and it is the policy of the Agricultural Department to run private seed farms by the agency of co-operative societies and their members. Some success has

been achieved in Upper Burma where a considerable amount of seed and implements have been distributed through co-operative societies, and private seed farms have been established which are run by co-operative societies and their members. In Lower Burma, progress is slower but the principle is gaining in popularity and the Agricultural Department look to the Co-operative Department for great assistance in the matter of running seed farms and in the distribution of the approved products of the Agricultural Department. The link between the officers of the two departments is close and, as the Agricultural Department supplies the material, the Co-operative Department will be in a position to assist in its wider distribution. From the statistics given, it cannot be said that co-operation has made any very marked impression in Burma as a whole. It is doubtful if more than five per cent of the total population who might become co-operators have as yet joined the movement.

12. COMMUNICATIONS AND MARKETING.

The physical features of the province have been the principal factors in shaping the systems of internal communication as these have been progressively developed. The general conformation of the country is that of river valleys separated from each other by great mountain ranges and these naturally present considerable obstacles to the construction of a general network of roads or of railways such as is possible in the great plains of India. The rivers have been the dominating factor and the tendency therefore has been for trade to establish itself most firmly in those areas possessing natural means of communication by water. In fact, it has been pointed out that only ten of the thirty-eight district headquarters cannot be reached at all times of the year by ocean steamers or river launch. When the British occupied Burma there were practically no roads in the accepted sense of the term, but only jinglo tracks, and such roads as were constructed in the early days of the British occupation were designed mainly to link up posts on the frontier with district headquarters. The first road of any importance was constructed in 1861 from Myedc in the Thayetmyo district through Prome to Paungde, and ten years later it was continued to Rangoon. When in 1874-77 a metre gauge railway was constructed along this road to connect Prome with Rangoon, a new road was necessitated parallel to the railway. Simultaneously a road between Pegu and Rangoon was constructed and its continuation to Toungoo was contemplated. But with the construction of the railway to Toungoo in 1885 the scheme was abandoned and attention was devoted to the construction of feeder roads. A road was also started from Moulmein, the ultimate terminus of which was contemplated as Ye, but this road has never been completed. Moulmein is now connected with Ye by a railway.

The annexation of Upper Burma diverted expenditure from communications in Lower Burma to the provision of roads for military requirements in the upper province, and frontier troubles led to the construction of numerous roads on the frontier. Fortunately, however, railway construction has kept pace with the general development of

the province, and the line from Rangoon to Mandalay was opened in 1889. An extension from Sagaing on the west bank of the Irrawaddy to Myitkyina was begun in 1890 and opened in 1899. The requirements of the delta were met by the construction between 1873 and 1900 of three canals to connect the creeks at the mouths of the Irrawaddy. Rangoon, Pegu and Sittang rivers to provide inland waterways for country boats. Of these, the Twante Canal is the most important. It has been widened and improved and is freely used by rice traffic while the Pegu-Sittang Canal is now utilised mainly by timber rafts. The third canal, the Sittang-Kyaikto, has become inoperative since the construction of the railway to Martaban. To sum up, at the beginning of the present century the communications of Burma consisted of about 1,100 miles of metre gauge railway line and 8,000 miles of roads of all classes in addition to the inland waterways. Within recent years, there has been a great advance in railway construction and the mileage is now approaching 2,000. Rangoon is connected by railway with Moulmein, Bassein, Mandalay, Myingyan, Heho in the Southern Shan States, Hsipaw and Lashio in the Northern Shan States, with Myitkyina in the extreme North and with the Lower Chindwin district. There are now about 10,000 miles of roads. The great difficulty in the maintenance of roads in Burma is the scarcity of metal in Lower Burma and the rapid deterioration of timber bridges which were used in the earlier days. A special sub-committee appointed in 1920 to examine road proposals for the province recommended an expenditure of no less than eight crores of rupees and these recommendations have been accepted by the local Government. The general financial situation also has considerably curtailed development and a great deal more expenditure has been incurred on maintenance and repairs than on original works. This may be seen from the fact that for the decade ending 1910 the average yearly expenditure on roads was only Rs. 18 lakhs for original works and Rs. 21.2 lakhs for repairs and for the decade ending 1920, Rs. 18.8 lakhs for original works and Rs. 33 lakhs for repairs. In 1919, Rs. 75 lakhs were specially allowed for expenditure during the next three years on road improvements and, in 1922, Rs. 244 lakhs were earmarked from the profits derived from the rice control scheme to be spent in conferring permanent benefits on the agriculturists of the province.

Since 1923, a Communications Board, which has been given powers of administration, was formed for the province and since then there has been a distinct forward movement in the matter of communications. It has considered 241 projects and approved of work estimated to cost Rs. 467 lakhs. The most important work sanctioned is the programme of trunk road construction which is to be completed in 1931. An important link in this chain of trunk roads is a bridge across the Irrawaddy at Sagaing, and it is understood that the sanction of the Government of India has now been accorded to its construction. This will link up the east and west banks of the Irrawaddy. Since the appointment of the Communications Board the expenditure, for the seven years ending 1926-27, has increased to an average of Rs. 43 lakhs on original works and Rs. 43.5 lakhs on repairs. The expenditure for 1926-27 on provincial

main roads alone has been Rs. 57.2 lakhs on original works and Rs. 38.9 lakhs on repairs. Of the 10,000 miles of road in the province, 6,000 are main roads which are maintained by the local Government and 4,000 miles are maintained by local authorities as district roads. Up till 1923, the Public Works Department was responsible for the maintenance of district roads, but since the passing of the Burma Rural Self-Government Act, this responsibility rests with district councils or with deputy commissioners in areas excluded from this Act. Where local authorities have not an adequate staff and plant, the Public Works Department undertakes maintenance of the roads. It is estimated that to maintain these district roads at their present standard Rs. 27 $\frac{3}{4}$ lakhs is required annually and to this the local Government make a contribution of Rs. 17 lakhs. In order to prevent works being carried out by any district council which are beyond the financial capacity of such district council to maintain, the local Government have limited the capital expenditure on district roads to Rs. 6 $\frac{1}{4}$ lakhs per annum and contribute the funds for other approved works which are carried out by the Public Works Department.

In common with other provinces of India, the advent of the motor car is making itself felt in Burma and the number of motor vehicles imported into Burma during 1926 was no less than 2,664. Wherever a road permits of it, motor bus services financed privately are immediately started to connect the surrounding villages with the nearest town, steamer or railway station.

It may be of interest to note the principle that is being followed in the construction of new main roads. Where possible, these follow the general alignment of established cart tracks, but when they run in the same direction as a railway they are generally constructed within two miles of the line and parallel with it, now on one side, now on the other, and crossing the railway at the principal towns or at suitable points about every tenth mile. They thus form lateral feeders to which subsidiary feeder roads of reasonable length may be constructed on either side of the railway to connect with the principal stations, and without such subsidiary feeders having to pass over or under the line. Main roads are from 22 to 24 feet broad, the central 12 feet being metalled with stone, and permanent bridges are now being put in with a 16 feet broad roadway capable of taking a weight of 12 tons. The cost of construction varies from Rs. 30,000 to Rs. 50,000 per mile according to whether stone and laterite are obtainable locally and the cost of maintenance varies from Rs. 1,500 to Rs. 5,000 per mile. Under the direction of the Communications Board and subject to the possibility of providing finance, an extensive programme of road construction in all districts on a definite plan has been initiated and is being rapidly pushed forward.

Marketing.

Marketing in Burma presents no particular features. The chain is from the small village broker to the local dealer residing in the surrounding markets and milling centres and thence to the small local mill or the

large rice mills in Rangoon. Formerly, it was the custom for these large Rangoon mills to give advances to their brokers to enable them to purchase paddy in bulk but it is understood that this custom has now been discontinued.

When a cultivator has threshed and winnowed his paddy, he sets aside enough to pay his land revenue if he is a landowner or his rent if he is a tenant. He then pays his hired labour and any advances he may have taken towards the expense of raising the crop under disposal. He then sets aside his *wunsa* or the amount which he calculates will be necessary for his domestic purposes for the year and the remainder he holds ready for sale. If a small man, he deals with the local village broker who arranges for its transport to the large broker at the local railway station or river siding. The ruling prices in Rangoon are generally well known in paddy-producing tracts and the cultivator seeks, by bargaining with the broker, to obtain a price as closely approximating to the Rangoon level as the broker may be willing to concede. Another matter of dispute is the basket with which the paddy is measured, for the basket varies from village to village in the most extraordinary degree even within a radius of five miles. As a rule, however, an amicable settlement is arrived at and there are few cases of serious dispute. Occasionally, the cultivator gets the advantage of carting his own paddy for which he is paid cart hire.

When the paddy has reached the large broker, various things may happen. If the broker is not working in direct arrangement with a Rangoon mill, he may store it in his own godowns for a rise in the market. Large ranges of these buildings will be seen at all the principal railway stations and at many of the river sidings in Burma. If he adopts this policy, he can hold the crop for a rise in price, or, in other words, speculate on the market. If he does not incline to speculation, he can dispose of the paddy at once to the numerous local small rice mills which within recent years have sprung up in formidable numbers all over the delta or he may forward it at once to the large rice mill in Rangoon. The produce of the small mills either finds its way to Upper Burma or is sold in the neighbourhood of the mill or it may be sent after milling to Rangoon, where it is handled both by the brokers and by the large shippers, in the latter case being frequently re-milled. Another industry which has sprung up within recent years and which is mainly in the hands of the small millers is the parboiling of rice for the Madras and Ceylon markets.

The bulk of the crop, however, is dealt with by large mills in the ports of Akyab, Bassein, Mouilmein and Rangoon. These mills classify paddy by the somewhat artificial distinction of rail and river paddy which, so far as they are concerned, merely means the route by which the paddy arrives, although in actual fact there is a slight difference in the quality and class of paddy carried by the different routes. Rail paddy, as a rule, is a short-lived variety and slightly inferior to the boat paddy, which is a long-lived variety. This latter has the advantage that it has generally been put straight from the threshing floor or river siding into

the paddy boats and is therefore cleaner and has suffered less from adulteration.

All the large rice mills have their sidings or jetties and at these the paddy is delivered to the mill from the railway or from the country boat. In Rangoon the method of purchase is on the basis of a 9 gallon basket weighing 46 lbs, a bonus being given for weight in excess of 46 lbs, and a proportionate cut if the paddy weighs less than 46 lbs. There are numerous complaints of collusion between the weighman, the broker and the tally clerk, but these are not serious. It may be remarked that a considerable amount of skill can be exercised in measuring paddy as paddy lightly dropped from a height into the weighing basket may weigh considerably less, bulk for bulk, than does a basketful closely filled and pressed down, but the paddy seller, as a rule, is no fool and is quite capable of looking after his own interests. There are, of course, numerous cases of theft from wagons or boats while in transit or while stored on the threshing floor and at railway sidings, but this is a feature by no means peculiar to Burma. There are also constant complaints of the lack of supply of railway trucks, but, as a rule, the railway administration does all it can to deal with the crop at the rush period.

The marketing of cotton is not quite so satisfactory. As a rule, this crop is grown by a small cultivator who is generally in financial difficulties. In some cases, if his debts are considerable he finances his agricultural operations on credit and on the arrangement that he repays in *kapas* when the crop is plucked. Naturally not much is left to him by the time his crop matures. If his indebtedness is not so acute and if he can finance himself until the picking season, he may still be obliged to have recourse to the village trader for money to tide him over and, here again, the arrangement is to repay the cash loan in *kapas* at a fixed market price. This fixed price, it is to be feared, is generally in favour of the trader and the price must cover the interest on the loan and the risk taken. It is only in rare cases where a cultivator can refuse financial help altogether that he gets the full benefit of his crop.

These arrangements have far-reaching effects, not the least of which is the agricultural disability created. Instead of being able to keep their best seed, these cultivators have to hand over their whole crop to the trader and to buy back from him any seed which he likes to supply. As a result, it is seed of bad germination and mixed seed that comes back to the cultivator and the efforts of the Agricultural Department to improve the crop are, for that reason, handicapped. It is unfortunate that in cotton there is no free market. The cultivator is, in the first place, in the hands of the trader who does not deal with large ginneries direct but works through a broker and thus there is a long chain between the field and the mill, which militates both against the cultivator and against the efforts of the Agricultural Department to improve his crop. The Agricultural Department has attempted to open cotton markets as recommended by the Indian Cotton Committee, but it is understood that no great success has so far been achieved.

The other commercial crop of importance is groundnut, and the eccentricities of this market are graphically described by Mr. Chalmers:

Development Commissioner, in a memorandum submitted to the Commission from which the following is an extract:—

“ The cultivator in marketing this crop is less well organised than in the two crops already discussed. The main markets are on the river bank from Pakokku to Allanmyo. The Magwe market, which is probably the worst from the cultivator's point of view, may be taken as a sample of the seller's experience in disposing of his crop. The cultivator arrives in Magwe,—generally overnight in order to save his cattle travelling in the heat of the day—he puts up at the compound of his broker and early in the morning the local buyer appears on his bicycle and bargaining begins. The buyer examines the consignment and depreciates it as much as possible; the broker, if he is honest, holds a brief for the cultivator,—by rotpue ho seldom is—his bias is towards the buyer with whom he has many transactions, whereas he sees the seller but once a year. If a bargain is struck, the cart of nuts is chalked, and proceeds to the buyer's godown or dump. Here the usual chicanery takes place. The nuts are delivered on a weight *cum* volume basis. The baskets vary considerably at the various stations. The Rangoon basket is supposed to weigh 25 lbs. and the prices advices are on a F. A. Q. standard. The buyer's measurer takes over on a Magwe basket heaped, which normally weighs 37 lbs. If the Rangoon quotation is, say, Rs. 180 per 100 baskets the Magwe buyer adds to this fifty per cent to cover the basket difference, and deducts Rs. 50 the freight charge to Rangoon to get a starting price; whatever he is below this is gain—gain of a perfectly legitimate kind: but it is at this point that the cultivator is skinned. From time to time a basket is weighed and should it fall below 37 lbs. a cut is made on the price of the consignment. No bonus is given for an excess in weight as in the case of paddy. The basket is heaped up with nuts and may be pressed down or shaken. In the latter the weight may go up as high as 40 lbs. per basket, and the loss be as much as eight per cent of his crop. The nuts spilled are the perquisite of the measurer; in a morning's weighing this may amount to something considerable as any 'broken basket' is also his.

The cultivator is but a child in the hands of the broker and the measurer. If he attempts to adulterate his nuts with husk or shell, he is caught out when the basket is weighed, and the cut is sufficient to cover the buyer's probable loss. Shingle added is easily detected. Watering when the nuts have to travel a long way so that there is time to absorb it, and steaming for quick absorption of weight are resorted to; but the buyer and measurer meets this every day and can soon detect 'doctored' nuts. These are the difficulties of the cultivator when the deal is on the straight. What are his chances when the broker takes secret commission, the measurer is a rogue, and the weight false? For the present indifferent methods the cultivator has himself in part to blame. He has but to organise and he can dictate his own terms provided they are reasonable. He could, if he had sufficient intelligence, less suspicion, and any power to combine, market his produce in an open market, where prices would be known daily on advice from Rangoon, sell by weight which is the best test of good nuts, unless we are going to test for oil content and have proper

stamped scales and a neutral weighman. Until this is done there can be little improvement in the market conditions. To summarise: the ideal we ought to struggle for is:—

- (1) an open market with daily market prices published (elimination of the broker);
- (2) sale by weight with a bonus for consignments over F. A. Q.;
- (3) genuine weighment by neutral tallymen.

The first two can be accomplished if the cultivator through his societies will combine; but strange to say Magwe district is one of the areas where co-operation has not taken hold.

The third is a difficulty, as honesty is a rare quality, and where it does exist it is apt to be destroyed by the seller or buyer bribing the man appointed to give them a square deal.

The cultivator has been done so often, that he is a bundle of suspicions: the better the plan devised for his good, the more suspicious he becomes: the fact that he cannot detect a catch in a good scheme only confirms him in his belief of the cunning used to invent it. He will in most cases have none of it; if he does come in, he comes in with the intention of perverting it at the earliest opportunity. Arcadia only exists in the imagination of the poets. The agriculturist enjoys 'slim' practice so long as he is not the victim. Buying by weight is steadily gaining in favour and the other riverine markets have adopted it. Magwe will in time follow. The question of freight has not been examined: but Rs. 50 for the freight of about 1½ tons of nut from Magwe to Rangoon appears to be excessive; the crop is a bulky one and takes up much space. The Myingyan method of dealing with the nut is more economical. The oil is pressed, the shell burned, and the cake resulting is in the best form for transport. The oil can be disposed of in the province, and the cake exported for cattle-feed. Perhaps the line of advance here is the small mill; but the difficulty is to deal with the by-product; the cake in a small unit: it means expensive hydraulic presses and good marketing facilities for the oil and cake if the venture is to be a success."

With regard to the marketing of cattle, this also is somewhat haphazard and there are no real stock markets in the province. As has been pointed out, the dry zone is the great breeding centre of Burma and the animals from this area are drifted down the river on rafts, marched down by road or conveyed by train to Lower Burma. There is a kind of cattle market at Allamyo in the Thayetmyo district on the east bank of the Irrawaddy and this has attained some reputation and is fairly successful. Should sales not be effected there, the cattle continue their march south to Paungle in the Promie district where a considerable business is also done. Pyawhhwe in the Yamethin district is also a large cattle-dealing centre where many cultivators go to buy their supplies, but the markets are not organised or controlled. The ordinary vendor of cattle is the cattle breeder who has his own stock to dispose of, buys a few from his neighbours or is entrusted with the sale of others and starts off on his march southward selling as he goes. The other dealers are large buyers from Lower Burma who go to cattle-breeding centres buying from village to village and on their return disposing of the animals in their own local

areas in Lower Burma. It may be remarked that a considerable number of cattle also come in to the more eastern districts of the province from Siam and the French States.

13. LOCAL SELF-GOVERNMENT.

Local self-government in the sense in which it is known in other parts of India only came into effect with the passing by the local legislature, in 1921, of the Burma Rural Self-Government Act. This enactment provides the basis for the education of the rural population in the responsibilities of representative institutions by transferring the administration of local matters outside municipalities, including vernacular education, from purely official control to elected councils and boards, such local bodies being, as far as possible, neither assisted nor controlled by government officers. Prior to this the only suggestions of local self-government in the accepted sense were municipalities of which, as a rule, the Deputy Commissioner was president with an official or non-official vice-president and in the smaller towns, town committees. Outside these areas rural administration was regulated by the Burma Village Act administered by village headmen and village committees. Prior to its amendment in 1924, the village headman was practically all-powerful within his village tract, but since that date some of his powers have been transferred to a village committee, especially in connection with the trial of civil and criminal cases. Under the Act, it is the duty of the headman to report certain matters to the officer in charge of the nearest police station, for instance, the arrival in his village of any suspected criminal, the committing of or the intention to commit various major offences, the occurrence under suspicious circumstances of any death in his village tract and any matter likely to affect the maintenance of order. His main duty, however, is the collection of the revenue of his tract and the general supervision of his village. Rules have been made under this Act prescribing the duties of the headmen of village tracts in respect of contagious or infectious diseases among human beings and it is also under this Act that are defined the duties of the headman and residents of a village tract in respect of the prevention and suppression of cattle disease. These undoubtedly have formed a very powerful assistance to the Veterinary Department.

With regard to the Burma Rural Self-Government Act, 1921, this Act provides first for the creation of circle boards and secondly for district councils. So far, however, the only functions definitely assigned to circle boards are the election of members to the district councils and the submission of an annual statement of their requirements and estimates of expenditure for the coming financial year. Other functions can be exercised only on the transfer of any matter by the district councils under Section 53 of the Act and, in general, district councils have made no complete delegation of the control and administration of any matters to the circle boards. A further delegation would be from circle boards to village committees which are contemplated in the Burma Village Act as amended in 1924, but since the circle boards have had no functions

delegated to them which they can delegate in turn to village committees under Section 25 of the Burma Rural Self-Government Act, 1921, these committees cannot yet take any place in the scheme of rural self-government as dealt with in the Act. And, indeed, so little has been delegated to circle boards that they are practically moribund.

It is too early as yet to say what success will attend these councils as they only really came into effect at the end of 1923, but there is no doubt that at present they are suffering from lack of trained secretaries, engineers and other staff, while the inexperience of the members is also an obstacle to rapid advance. It thus follows that in the meantime a large number of duties are performed as they were before the introduction of the Act, for instance, village headmen continue to have duties in respect of public health and the health of cattle in subordination to the district officers of Government and independent of the new local bodies, and the Public Works Department does a considerable amount of their road construction and maintenance. These difficulties, however, are merely temporary and will disappear as experience is gained.

The total provincial contributions to district councils during 1926-27 was Rs. 36,73,842. Of this total Rs. 18,83,816 was for education and Rs. 17,90,026 for general purposes*. The total receipts of district councils (excluding opening balance and debt) were Rs. 95,48,474 and their payments (excluding debt) Rs. 76,94,851.

14. PUBLIC HEALTH AND SANITATION.

As a rule, the Burman is vigorous, healthy and active; and although rice is the staple food the population does not suffer from the deficiency of diet which seems to depress other rice-eating groups of India. This is probably due to the fact that his diet is varied and that, even in the poorest household, salt fish forms an integral part of the food ration. In addition, a very large amount of country vegetables and roots are consumed, while the fact that the preparation of the raw paddy in the village hullers does not lead to high polishing or the removal of nutritive portions of the rice probably contributes to the soundness of the diet. In the more congested parts of Lower Burma, however, the very large influx of Indian immigrants, who, in 1925-26, numbered no less than 408,464, tends by the somewhat lower standard of living of these immigrants to depress the average level of nutrition, while there is no doubt that by this same agency a considerable amount of disease is introduced and spread. That the Burman is on the whole better fed than the other races of India may be inferred from the expectation of life figures which were worked out for the 1911 census: these enquiries gave an expectation of life for a Burman male as $31\frac{1}{2}$ years and for a female $32\frac{1}{2}$ years, figures which are only approached by Madras where the expectancy of life for males is 26 and females over $27\frac{1}{2}$. In other provinces the figure is about 21. Added to this is the fact that, except in the largest cities, there is very little congestion of population

* Of this sum Rs. 10,77,811 was for public works, Rs. 3,08,105 for public health and Rs. 2,80,711 for medical purposes.

as Burma is much under populated, the average density of population per square mile being only 68, the next province being the Central Provinces with 139 to the square mile, rising to no less than 608 persons to the square mile in Bengal.

Burma is subject to diseases similar to those which work havoc in India and amongst the most important of these, and by far the dominating disease, is fever in one form or another. When we consider that for six months of the year, the delta of Lower Burma is practically entirely under water and that for months afterwards shallow pools are left scattered about the country—most suitable breeding grounds for mosquitoes—it is not to be wondered at that a large number of the population are constant victims to malaria. This liability to malaria undoubtedly reduces the working efficiency of a large part of the rural population. Plague is now more or less established in the province, principally in Rangoon from which it is liable to be disseminated up-country. Cholera outbreaks are frequent and there is a considerable amount of small-pox. Hookworm disease is also unfortunately present, though so far it has not proved serious.

As regards hygiene, the Burman is by habit scrupulously clean and the houses are as a rule also kept in a tidy and orderly manner. There is, however, a tendency to carelessness in the village surroundings and the general custom of keeping the cattle in villages at night as a protection against cattle theft does not tend to improve matters. Wells and drinking tanks are apt to be neglected and the ideas of rural hygiene may be said to be of the most primitive. It may be remarked, however, that as in the delta the population lives in houses surrounded by water for a considerable part of the year, it is not easy to attend to matters of village hygiene though it may also be hoped that the thorough cleansing with water which the villages receive during this period may do something to remove accumulations of filth and refuse.

Within recent years, the Public Health Department in Burma has been very substantially strengthened and during the year 1925-26 the total amount spent in the province on civil sanitary works was Rs. 54.37 lakhs, of which Rs. 18.64 lakhs were devoted to water supply and Rs. 19.8 lakhs to conservancy. In the towns and municipalities the percentage of income spent on conservancy was 6.01 and on water supply 5.87 and the total expenditure on sanitary works was Rs. 49,72,000. But the department is by no means strong enough to deal with the great problems of the country. At present it consists only of the Director with two assistant directors, and in most districts the civil surgeon combines with his duties as medical officer those of district health officer. Recently sixteen Burman sub-assistant surgeons have been placed at the disposal of the Public Health Department but this number must be very much increased if any impression is to be made on the province. A Public Health Institute has been opened in Rangoon and doubtless, with this provision for training, the staff of district health officers will in due course be largely increased.

In conclusion, it may be remarked that very considerable improvement has been effected in the sanitary condition of some of the larger

riverine towns of the delta by raising their level. This has been effected by pumping up sand by dredgers from the adjacent rivers. In some cases this has been accompanied by a new layout of the towns and in these areas the general health has been materially improved.

While the expansion of medical relief has gone on rapidly and there is now practically one medical institution for every 794 square miles of country and for every 45,000 of the population, these schemes hardly touch the needs of the rural population as the hospitals are in the main located in the towns. A scheme has, therefore, been drawn up by which private practitioners and retired sub-assistant surgeons are given a subsidy of from Rs. 50 to Rs. 125 per month provided they will settle and practise in smaller towns where no hospitals or dispensaries exist. At present 13 such practitioners have settled down to practice, apparently with considerable success, and arrangements are being made to extend this scheme and obtain more medical men on these terms. In time it is hoped that by this arrangement modern medicine will be brought within the reach of a greater part of the population, at present dependent on the indigenous Burmese medical practitioners who, as in almost every country, have a large following. Government has devoted its attention to this type of practitioner and schemes for training have been originated which will enable him to bring to his indigenous theory of medicine at least the principles of cleanliness, asepsis and the application of antiseptics.